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Observations of the apparent Distances and Positions of 380 Double and Triple Stars, made in the Years 1821, 1822, and 1823, and compared with those of other Astronomers; together with an Account of such Changes as appear to have taken place in them since their first Discovery. Also a Description of a Five-feet Equatorial Instrument employed in the Observations. By John Frederick William Herschel, Esq. F.R.S. and James South, Esq. F.R.S. Read January 15, 1824. [Phil. Trans. 1824, p. 1.]

The determination of the apparent distances and positions of such double stars as could be measured with micrometrical instruments and high magnifying powers, was suggested by Sir William Herschel more than forty years ago, and in his hands it led to a new department of physical astronomy, by the discovery of sidereal phenomena referrible to the agency of attractive forces; but the determination of the existence of annual parallax, the immediate object for which the inquiry was instituted, was soon lost sight of in the more extensive views of the construction of the universe, which gradually unfolded themselves. Nor has the investigation been resumed, although from the precision with which such observations can be made, it seems, in the opinion of the authors of this paper, likely to be the mode by which the existence or non-existence of sensible parallax will ultimately be determined.

The results of Sir William Herschel's observations, from 1779 to 1784, were published in the Philosophical Transactions from 1782 to 1785; and a re-examination, after a lapse of twenty years, was undertaken by him in 1801, -2, -3, and -4; and in the Transactions for 1802 and 1804, unexpected phenomena were communicated. Instances in which two stars were performing to each other the offices of sun and planet were proved to exist; and to more than one pair the period of rotation was, according to the observations of the authors of this paper, ascertained with considerable exactness. Immersions and emersions of stars behind each other had been witnessed; and real motions among some of them had been observed rapid enough to be detected in very short intervals of time.

But as from the novelty of the subject, and from the imperfections of the micrometers employed in 1779 and 1780, it was likely that some instances of error had occasionally crept in, it became desirable that a second re-examination should be instituted:—accordingly, in the year 1816, some progress was made by Mr. Herschel towards its accomplishment, and the results are communicated in the present paper. A similar idea having likewise occurred to Mr. South, it was at length determined that the observations should be carried on in concert, and with his instruments.

Meanwhile (unknown to the authors of this paper) a similar undertaking had been entered upon by a distinguished continental astronomer, Mr. Struve, Director of the Imperial Observatory at Dorpat; and the general coincidence between the measures of this observer and those of their own, is deemed at once interesting and corroborative of the accuracy of both.

The instruments with which the observations accompanying this paper were made, are a five-, and a seven-foot equatorial; the former was constructed under the direction of the late Capt. Huddart, and is remarkable for its extreme lightness, for the promptitude with which it obeys its adjustments, and for its ability in retaining them. Its object-glass, of $3\frac{3}{4}$ inches aperture, and of five-foot focal length, is the work of the late P. and J. Dollond; whilst its divided circles, microscopes, &c., were completed by Messrs. J. and E. Troughton. A description of it is given, and a drawing is annexed. The latter is a telescope of 7-foot focal length, and five inches clear aperture; it was made by Tulley, and is mounted on the polar axis of the old equatorial sector, made by Sisson for the Royal Observatory, and for the use of which, acknowledgment is made to the Council of this Society.

The micrometers employed are the work of Mr. Troughton, and have long since been familiar to astronomers under the name of Troughton's Wire Micrometer. The measures of distance are all central. Various precautions employed in conducting the observations are narrated; contrivances whereby some difficulties were surmounted are enumerated. The observations of each star were generally made in each other's presence, but occasionally in different parts of the observatory, and with different instruments, without any communication with each other. In some instances the observations of Mr. Troughton or Mr. Richardson have been appealed to, in order to settle discrepancies.

To the observations of each star the authors attach their mean result; the results obtained by other observers are also placed in the order in which they were made; but there is one circumstance to which they solicit attention, namely, that as far as Sir William Herschel's observations are concerned, the dates and results will not accord with those published by Sir William in the Transactions, for reasons which will be found in a former part of the paper.

As an appendix, measures of a few stars less perfectly observed are added, which, although not entitled to equal confidence with the others, the authors think may perhaps still have their use.

On the Effects of Temperature on the Intensity of Magnetic Forces; and on the Diurnal Variation of the Terrestrial Magnetic Intensity. By Samuel Hunter Christie, Esq. M.A. of Trinity College, Cambridge, Fellow of the Cambridge Philosophical Society: of the Royal Military Academy. Communicated by the President. Read June 17, 1824. [*Phil. Trans.* 1825, p. 1.]

The details of the author's experiments upon the above subjects are given in an extended series of tables, commencing with a temperature of -3° Fahr. up to 127° Fahr. Mr. Christie found that as the temperature of the magnets increased, their intensity diminished, in direct contradiction to the notion of destroying magnetism by intense cold. From a temperature of 80° the intensity decreased ra-